

MG7173 Enterprise Data Systems

Thursday 6 – 8:15 PM RH-705

Joe Chizmarik, Adjunct Associate Professor

Professor's Email : bjthecyberdj@earthlink.net

- 9/06 9/13 9/20 9/27 • 10/04 10/11 10/18 10/25 • 11/01 11/08 11/15 11/22* 11/29 • 12/06 12/13 12/20 •
* No Class - Thanksgiving

<u>CLASS</u>	<u>TOPIC / CLASS NOTES</u>	<u>Homework</u>
#1	The Database Environment	Chapter 1
#2	Database Development Process	Chapter 2
#3	Enterprise Data Modeling	Chapter 3
#4	The Enhanced ER Model	Chapter 4

#5	Logical Database Design	Chapter 5
#6	Physical Database Design	Chapter 6
#7	Client/Server 1	Chapters 7, 8, 9
#8	Client/Server 2	Chapters 7, 8, 9

#9	Distributed Databases	Chapter 13
#10	Internet Databases	Chapter 10
#11	Data Warehousing/Data Mining	Chapter 11
#12	Database Administration	Chapter 12

#13	OODBMS 1	Chapters 14/15
#14	OODBMS 2	Chapters 14/15
#15	Enterprise Data Systems (student journals)	•Current Issues•

Textbook: [Modern Database Management](#), 8th Ed., Hoffer, Prescott, McFadden, Prentice Hall, ISBN: 0-13-221211-0, 2007.

This course addresses modern issues of large-scale information and knowledge management through design, development and implementation of different kinds of database technologies. The course introduces and elaborates data modeling through entity relationship method, relational model, SQL applications, database architecture, different types of database management systems, data integrity and administration, etc. The course also introduces emerging database technologies such as distributed Internet-based databases, distributed client/server databases, multidimensional databases, groupware, data warehousing and data mining for decision support, etc.

Class attendance is mandatory. A paper will be due on each class' lecture; each paper building on the preceding one. Failure to attend class will disadvantage the student and may result in lower grades due to the lack of merits on these weekly papers.

Each paper (15) should be 3 pages in length and will count for 3% of the final grade. Each paper will be due the following class . . . total **45%** of the final grade.

Class participation and involvement will count for **15%** of the final grade based on depth and scope of discussion.

Each student will keep and maintain a personal journal concerning database management issues throughout the semester (see course text, page 31, field exercise #5). This journal will be submitted on the last day of class during which each student will give a 3 minute discussion of it and its issues. This journal and discussion will count for **15%** of the total course grade.

The final paper/presentation will serve to bring the technical and management issues discussed in alignment with the business strategy of an actual or hypothetical company. The depth, scope, and maturity of the analysis as well as the overall technical/management plan outlined will determine the grade which will count for **25%** of the total course grade.

MG7173 Class Notes

Class 1: The Database Environment

Why Use Databases? (Chapter 1)

Traditional File Processing Systems

Program-Dependent Data
Data Is A Liability Not An Asset

The Database Approach

Standard Data Definitions
Data As A Corporate Resource

Variety of Database Applications

Personal, Workgroup, Department, Enterprise / Internet, Intranet, Extranet

Advantages of Databases

An Enterprise Approach
A Standard Data Environment

Databases: Costs & Risks

Training / Specialized Personnel
Data Conversion Problems

Components of the Database Environment (Figure 1-5, page 17, Course Text)

CASE Tools, Repository, DBMS
Database, Application Programs, GUIs
DBAs, Systems Support, Business Users

Evolution of Databases

The '60s: File Processing Systems
The '70s: Hierarchical & Network DBMSs
The '80s: Relational DBMSs (RDBMS)
The '90s: Object-Oriented (OO) & Object-Relational (OR) DBMSs

Today : Internet-based XML DBMSs / Universal Servers / Grid Servers

The Pine Valley Furniture Company (an example):

A Preliminary Data Model: Chapter 1, pg. 9, Figure 1-2b, Course Text & Lecture: ERD with Customer, Order, Order Line, Product, (Invoice), (Payment entities) and their attributes.

Key Concepts: data, information, knowledge, metadata, data model, entity, attribute, relationship, entity-relationship diagram (ERD), relational database, database management system

➤ **Databases turn your corporate data into an operational & strategic corporate asset !**

Homework: For Mountain View Community Hospital, Project Case, Chapter 1, Pgs. 33 – 35, Course Text, Case Exercise #4, Page 34. Draw and discuss the (ERD) diagram as indicated.

Class 2: Database Development Process

How to Deploy a Database (Chapter 2)

Information Systems Architecture
Traditional, Object-Oriented

Data / Processes / Networks
People / Events / Rules

The System Development Life Cycle (“Waterfall Approach”)
SDLC, Fig. 2-4 & 2-5, pgs. 43-44

Prototyping & Versioning (page 47)
Rapid Application Development (RAD)
Extreme Programming (small quick changes)

Managing the Development Process & Its People
Analysts (database / information systems)
Business Users (clients)
Programmers / Technical Experts
Administrators (data / database)

*Database Development
Process Modeling
Goals / Success Factors (Table 2-2, pg. 39)
Data Modeling
Corporate (business) Planning Objects
Entities / Attributes
Entity - Relationship Diagram
Business Function / Data Entity Matrix (Fig.2-3, pg. 44)

Database Deployment
Three Schema Architecture (Figure 2-9, page 57, Course Text)
– External (user views)
– Conceptual (administrator view)
– Internal (logical / physical)
Three-tiered Database Architecture (Figure 2-10, page 58, Course Text)
– Client (individual / desktop)
– Server (application / web)
– Enterprise (with DBMS installation)

Example: The Pine Valley Furniture Company - Toward A Working Database
Business Planning Objects (pg.63), ERD (pg.64), Entities/Attributes (pgs. 64-65)

➤ Databases are deployed as part of your distributed information systems architecture !

Homework: For Mountain View Community Hospital, Project Case, Chapter 2, Pgs. 76 – 82,
Course Text, Case Exercise #4, Page 81.

Class 3: The Entity-Relationship Model

Enterprise Data Model Details (Chapter 3)

Entity-Relationship Diagram (ERD)
Visualizing the Data Model

ERD Constructs:

Entities:

Strong, Weak, (pg. 98) & Associative Entities (pg. 108-109)

Attributes:

Simple, Derived, & Multivalued Attributes (pgs. 102-103)

Composite Attribute (pgs. 101-102)

Relationships:

Basic or Identifying Relationships (pg.98)

Degree of a Relationship:

Unary, Binary, or Ternary (pgs. 110-111)

Cardinality Constraints (pgs. 116-118)

Mandatory One, Mandatory Many

Optional One, Optional Many

Multiple Relationships (pg. 121)

Naming / Defining Relationships (pgs. 121-122)

Example: The Pine Valley Furniture Company - An Entity-Relationship Model (reference reading, pg. 125, text)

➤ Entity Relationship Diagrams model your business in all its important detail !

Homework: For the Mountain View Community Hospital, Project Case, Chapter 3, Pgs. 137 – 138, Course Text, Case Exercise #2, Page 138; use four related entities and their associated rules and constraints (user view) as thusfar stated (based on Figure 2-3, pg. 79).

Class 4: The Enhanced E-R Model & Business Rules

Advanced Enterprise Data Modeling (Chapter 4 / Appendix A)

Supertypes & Subtypes

Attribute Inheritance

Specialization & Generalization

Supertype/Subtype Constraints:

Completeness Constraints:

Total Specialization

Partial Specialization

Disjointness Constraints:

Disjoint Rule / Overlap Rule

Subtype Discriminators

Supertype/Subtype Hierarchies

Examples from text and common business experience

Entity Clustering - hiding complexity, user views, zooming in-and-out

EER Example: The Pine Valley Furniture Company - reference reading, pg. 153 - 157, text)

Business Rules (reference reading, chapter 3, text, pgs. 87 – 90)

Types of Business Rules / 'Business Rule' ERD Examples (pgs.166 – 174)

➤ The EER allows complex data modeling and the incorporation of important business rules !

Homework: For the Mountain View Community Hospital (Project Case, Chapter 4, pg. 183, Course Text), Case Exercise #1, develop an EER diagram (based on figure 2-3, pg. 79, text & your previous work) incorporating the business requirements outlined; draw & discuss the ERD.

Class 5: Logical Relational Database Design

Transforming the Data Model Into a Database (Chapter 5)

The Relational Data Model:

Data Structure, Keys, Relations, Attributes

- Primary, Composite, Foreign Keys

Integrity Constraints

Domain Constraints

Entity Integrity

Referential Integrity

Logical rDB Design:

Transforming ERD to DB:

- * Map Regular Entities (page 198)
 - Composite Attributes
 - Multivalued Attributes
- * Map Weak Entities (page 200)
- * Map Binary Relationships (page 201)
 - One-to-Many / Many-to-Many / One-to-One
- * Map Associative Entities (page 203)
 - Without special identifier
 - With special identifier assigned
- * Map Unary Relations (page 205)
 - One-to-Many
 - Many-to-Many (Bill-of-Materials)
- * Many Ternary/N-ary Relationships (page 207)

* Map Supertype/Subtype Relationships (page 208)

Normalization (page 211)

First Normal Form

Second Normal Form

Third Normal Form

Example: Pine Valley Furniture Company (pages 215-220)

➤ The Logical Database Schema is an important step in the creation of a working database !

Homework: For the Mountain View Community Hospital (Project Case, Chapter 5, Course Text, pages 235-239, Project Assignment #P1): from the EER (figure 3, pg. 78 & your prior homework), map a significant segment (user view) of the EER into a rDB schema; draw & discuss the EER segment and partial database schema.